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When Shall We Harvest?

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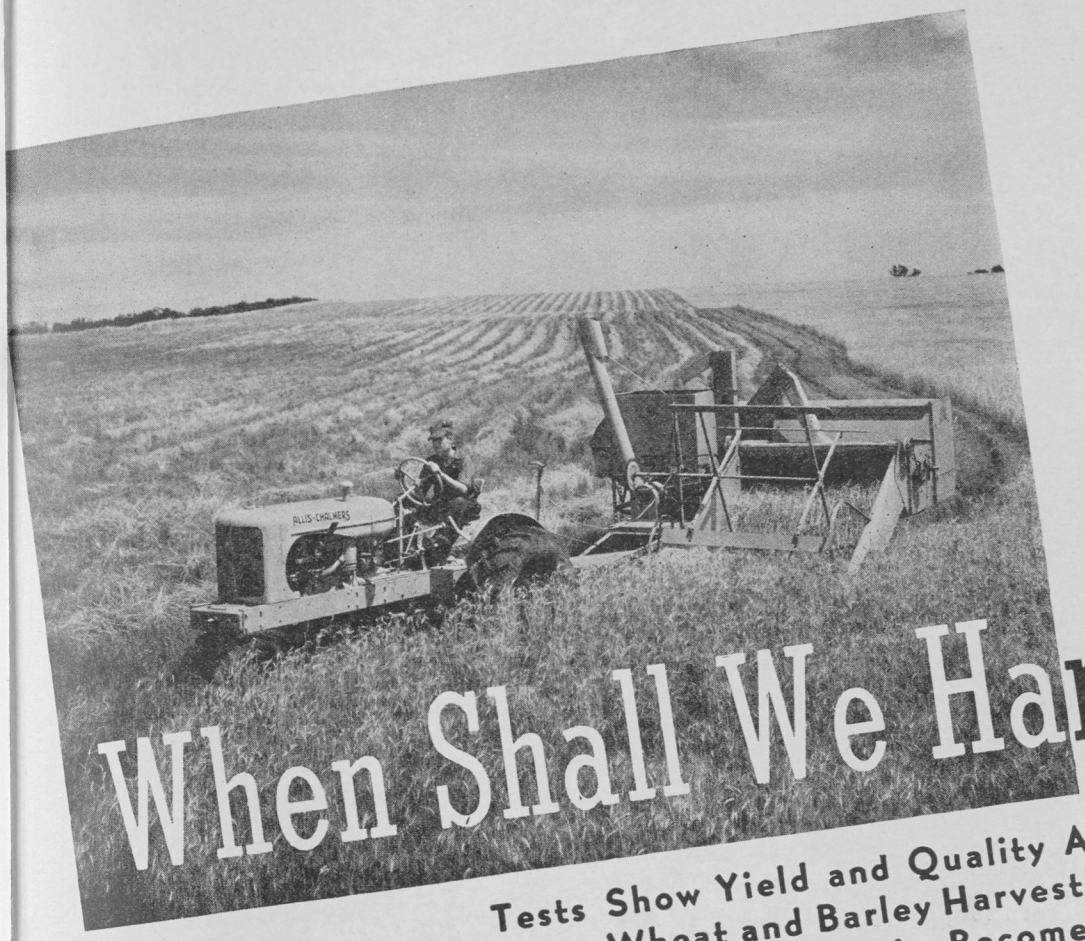


When Shall We Harvest?

Tests Show Yield and Quality Are Best When Oats, Wheat and Barley Harvesting Can Be Delayed Until the Grain Becomes Fully Mature

A FEW YEARS BACK, harvesting small grain was done just one way—when we thought the grain was ready to cut, or should be harvested to save it, we cut it with a binder, dried it in the shock and then threshed it.

Today, with combines scattered throughout Iowa, we have, in general, three choices: (1) We can allow the grain to stand in the field until it is mature and dry enough so that it may be combined—"direct" from the standing crop; (2) we can windrow the grain, leaving it lie until it is dry enough, pick it up from the windrow and run it through a combine ready for the bin; or (3) we can still cut the grain with a binder, shock it up and thresh it out with a threshing machine as we have been doing for years.

And so small grain harvesting in Iowa now days isn't done just one way. Which way is best? That's the question. If the grain is allowed to stand in the field until it is ready to combine and send to the bin, what are the probable gains in yield as compared with possible losses if it should have to be left in the field longer than had been planned?

We have been trying to get the answers to these questions here at the Iowa Station, as have agronomists at the Michigan, Illinois and Minnesota Stations.

We know that wheat, oats and barley produce maximum yields when allowed to stand in the field until fully mature. We know that the length of time that mature grain can be left standing without serious loss or damage depends largely on the weather, but it also depends on the crop and variety grown. On the average, we find that wheat and early oats have the longest safe period; for barley and late oats this period is short, when it exists at all.

By L. C. BURNETT

From various tests at the Iowa Station we have concluded that, on the average, increases in growth will be greater than field losses until the moisture content of wheat and early oats is down to about 15 percent and of midseason oats and barley to about 20 percent. If the grain is to be harvested with a binder, the yield will be higher if it is not cut until it is fully ripe. If the crop is to be combined, the length of time after maturity that it must stand will determine whether or not windrowing will be beneficial.

But how is the farmer to tell when his oats or his wheat is down to 15 or 20 percent moisture? An old custom that seems to work rather well is to crush a kernel on a steel wheel or the frame of the machine. If it breaks up into a "meal," it is

Threshing machines probably will be on the Iowa horizon for some time despite inroads of combine.

down at least to 15 percent; if the kernel is gummy, the moisture is above 20 percent. Some "old timers" chew the kernels and use the same system of judging—if the kernels snap between the teeth into small pieces, the moisture content is 15 percent or lower; if the kernel chews up gummy, it is over 20 percent in moisture.

One of the small grain harvesting experiments that is still considered classic was performed by Dr. Kedzie at the Michigan Station in the early eighties. He harvested wheat every day from flowering time to 2 weeks past maturity and showed that the kernel developed and the yield increased at a comparatively even rate for about 4 weeks from the date of flowering. This period he broke up into the water stage of 10 days, the milk stage of 8 days and the dough stage of 8 days. After this, through the next 2 weeks, which he designates as the hard and flinty stage, he found practically no change in yield.

Later experiments at Michigan, Minnesota and Iowa indicate that in many seasons crinkling and shattering losses begin about a week after the flinty stage is reached. Our experiments at the Iowa Station in 1927 and 1928 showed that while these losses were small they were continuous after the moisture content of the grain dropped below 15 to 20 percent (in 1927, 15 percent; in 1928, which had more rain during harvest, the wheat losses started at 20 percent moisture).

Our Iowa investigations with oats show a pronounced difference between varieties. Most of the early maturing varieties like Iowa 105 and Iogold behaved somewhat similar to the wheat. The losses started around the 15 percent moisture content but were much heavier than those of the wheat varieties studied. With the later maturing oat varieties, Silvermine and Green Russian, the losses started before the moisture content had reached 20 percent and were increasingly heavy the longer the crop was left in the field.

In the Iowa experiments we harvested the grains twice a week from the early milk stage until after they were dead ripe. The moisture content and yield were determined at each harvest date. The weather conditions of the two seasons during which the studies were in progress were very different. In 1927 harvest conditions were ideal throughout the summer. The grain ripened normally and dried rapidly. The 1928 harvest period had two heavy rainstorms, one with some hail, and a week of cloudy weather. The accompanying table shows the date upon which the peak yields were obtained. Considering the length of time between the date of these peak yields and the date when the moisture in the grain was down to 15 percent, and therefore safe to put in storage, apparently most of the varieties could have been combined direct in 1927, but in 1928 all the mid-season varieties of oats, and all the barley except Minsturdi, should have been windrowed if serious loss was to be avoided. Considering the length of time the grain had to stand before it

YIELDS OF DIFFERENT VARIETIES OF WINTER WHEAT AND OATS AT THE IOWA STATION WHEN HARVESTED AT DIFFERENT DATES.

Variety	Peak yield			Ready to combine direct and store			
	Date	Acre yield	Moisture content	Days delay	Date	Acre yield	Loss from delay
	1927						
Iobred wheat	7/18	39.4	14.8	0			
Ioturk wheat	22	27.6	29.9	7	7/29	25.8	4.3
Iogold oats	21	59.3	10.0	0			
Iogold oats	28	64.3	12.0	0			
Iowa 105 oats	25	51.8	10.4	0			
Iowar oats	22	44.2	15.6	4	26	42.9	1.3
Green Russian oats	29	40.8	16.4	2	8/1	36.1	4.7
Oderbrucker Barley	21	29.7	16.8	4	7/25	25.7	4.0
Oderbrucker Barley	21	30.1	13.6	0			
	1928						
Iobred wheat	7/16	46.7	25.5	7	23	43.8	2.9
Turkey wheat	13	34.4	34.5	10	23	33.0	1.4
Iogold oats	16	66.1	33.5	10	26	64.7	1.4
105 oats	16	54.5	26.5	7	23	52.4	2.1
Iowar oats	16	58.9	35.5	10	26	58.1	.7
444 oats	18	56.4	29.6	12	30	45.7	10.7
Iogren oats	24	56.5	19.4	10	8/4	35.0	21.5
Iomine oats	24	63.5	26.0	10	4	39.7	23.8
Oderbrucker barley	17	30.1	40.4	23	10	18.3	11.8
Minsturdi	16	38.2	28.0	7	7/23	32.6	3.6
Trebi	14	42.0	40.5	26	8/10	28.8	13.2
Velvet	14	37.3	45.0	15	7/29	22.7	14.6

was safe to store, it would have been much safer to have windrowed all the varieties in 1928.

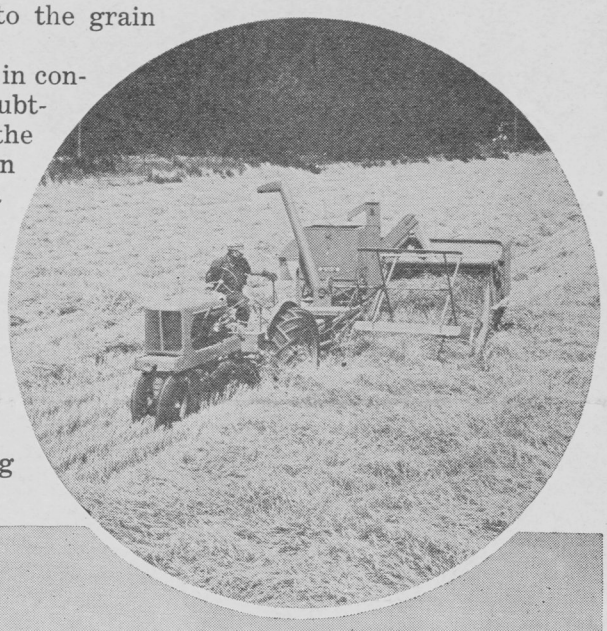
The coming of the combine as a more-or-less common method of harvesting small grain has stimulated interest in several research projects dealing with the optimum degree of maturity, considering both yield and quality. These investigations have led to some modification in our ideas as to what takes place while the grains are ripening, both before and after they are harvested. Most of the earlier investigation and observation was conducted under much more humid conditions than we have in Iowa; many of the notions that arose from them have been found to be inaccurate when the conditions are modified to fit the climate of our dry prairie summers.

One of these notions was that when grain had reached the late milk or dough stage, it might as well be cut and allowed to "fill-out" in the shock. Some of the early experiments tended to confirm this idea, especially if the drying process took place sufficiently slowly, covering 2 or 3 days.

In a 4-year series of experiments in Illinois, wheat was harvested at five stages of maturity. One sample was dried in the sun, a second in the shade and from a third the heads were cut and dried in the shade. The wheat harvested in the watery, the milk, the dough and the ripened stages increased in yields when cured on the straw. This increase was greatest when the curing was slowed by shade. At the fully ripe stage there was no increase during the curing process. In a later experiment at Minnesota the period of translocation in barley was prolonged up to 8 days by keeping the straw moist. Somewhat different results were obtained from experiments in Canada, Michigan and Minnesota under conditions which perhaps more nearly fit our midwest harvest conditions. These investigators conclude that there is little or no transfer of material from the stalk to the grain after it is cut.

These differences in conclusions would doubtless disappear if all the samples had been dried rapidly—a condition we all want in a normal harvest.

Another notion that once had considerable standing was that the quality of wheat was much improved by being cut "full-green." This may have grown out of the fact that most of the protein and the other nitrogenous materials are deposited in the grain early in the filling period while the starch deposition increases almost to maturity. By cutting green a higher protein content might be obtained than when the material is allowed to become fully ripe. This philosophy is hardly justified as numerous experiments at Michigan, Minnesota and in Canada have repeatedly shown that quality as well as yield improve from blossoming time to maturity and that the quality continues to improve for some days after maturity, probably until storms cause swelling of the kernel.



Wheat, oats and barley produce largest yields if allowed to stand in the field until fully mature. Length of time that mature grain can be left standing without serious loss or damage depends on the weather, crop and variety that is being grown.